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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

MENON, KRISHNAN S

ART UNIT	PAPER NUMBER
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1723

DATE MAILED: 10/23/2002

6

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/724,883

Applicant(s)

TOMASCHKE, JOHN EDWARD

Examiner

Krishnan S Menon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 15-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

Claims 1-26 are pending in this application. Of these, claims 1-14 are cancelled as non-elected.

#### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 15-20, 22, 25 and 26 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Chau et al (US 4,983,291).

Chau (291) teaches a composite membrane comprising a supportive porous under-structure, a top layer of cross linked polyamide thin film on the top of a porous polysulfone support structure, the top layer having contacted with an organic sulfonic acid compound whereby the membrane shows a salt rejection of at least 25% and flux of about 15 GFD as in instant claim 15 (working examples, col 4 line 51- col 8 line 21).

The porous backing is a polysulfone (instant claim 18), with aromatic diamine (instant claim 16) aromatic diacyl halide (instant claim 17), it is a thin film flat sheet (instant claim 19), the sulfonic acid is toluene sulfonic acid (instant claim 22), sulfonic acid in water (instant claim 25), and salt rejection better than 80% at flux greater than 5 GFD (tables, working examples, col 4 line 51- col 8 line 21)

#### *Claim Rejections - 35 USC § 103*

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 15-26 are rejected under 35 U.S.C. 103(a) as obvious over Cadotte (US 4,765,897) in view of Koo (US 6,063,278).

Claims 15, 22-25: Cadotte (897) discloses a membrane comprising a porous support layer (col 2: 65-66); a cross-linked polyamide top layer (col 1: 50-60) with a rejection of over 90% at 25C and 200 psi with 15 to 30 GFD flux for 2000 ppm NaCl feed. At 75 psi, this translates to 6 to 12 GFD. Cadotte discloses this membrane to have over 20 GFD flux and over 75% MgSO<sub>4</sub> rejection at 50 psi after treatment with a mineral acid like sulfuric acid. (col 5:5-23). However, Cadotte (897) fails to disclose the use of organic sulfonic acids like MSA or other alkyl or aryl sulfonic acids. Koo (278) teaches the use of a number of organic sulfonic acids including MSA (col 6: 1-8 and examples 1-25, page 7), in making a cross-linked polyamide membrane on a supportive porous understructure made from various polysulfones or similar compounds, as claimed in instant claims 15-26. Koo

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however teaches the addition of the organic sulfonic acid prior to the cross-linking of the polyamide membrane by adding the organic sulfonic acid to the multifunctional amine solution, and then treating the membrane with the multifunctional acid chloride to form the polyamide. Use of Koo's (278) method also indicates substantial increase in flux (over 15 GFD estimated at 75 psi) without any significant loss of NaCl rejection (90%) for 2000 ppm NaCl (example 12, 13, page 7) compared to the instant claim 15. It would be obvious to one of ordinary skill in the art at the time of invention to use Koo's (278) selection of organic sulfonic acids in place of the mineral acid like sulfuric acid as disclosed by Cadotte (897) to make an RO or microfiltration membrane with enhanced flux. One ordinarily skilled in the art at the time if the invention could chose an organic sulfonic acid as taught by Koo (278) instead of sulfuric acid as alternate, but equivalent method of treatment for obtaining enhanced flux as taught by Cadotte.

Claims 16-21, 26: Cadotte (897) discloses multifunctional amines and acid halides (col 3: 16-43), various polysulfone porous supports (col 3: 3-10); thin film composite, spiral wound, etc, (col 3: 55-65); and the salt rejection and flux in terms of  $\text{MgSO}_4$  solution. Cadotte discloses a rejection of over 90% with 15-30 GFD flux for 2000 ppm NaCl before the acid treatment. However, Cadotte fails to disclose use of sulfonic acids in the membrane to enhance flux (uses mineral acids instead) or the salt rejection in terms of NaCl after the treatment. Koo (278) teaches multifunctional amines and acid halides (col 5: 10-65), various porous supports including polyarylether sulfone (col 4: 39-46); thin film composite (example 1), various sulfonic acids and solvents for sulfonic (all col 6: 1-8); and the NaCl rejection and flux above what is claimed by instant claim 26. Koo (278) also teaches the use of mineral acids as interchangeable with sulfonic acids (col 3 lines 33-37). It would be obvious to one ordinarily skilled in the art at the time of invention to chose Koo's teachings of use of organic sulfonic acids as alternate but equivalent to the use of mineral acids as taught by Cadotte

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(897) for enhancing the membrane flux. One of ordinary skill in the art could chose a sulfonic acid as taught by Koo (278) in place of a mineral acid as taught by Cadotte (897) for enhancing the flux of a polyamide thin film membrane.

It may also be noted that the mineral acid or the sulfonic acid does not stay in the membrane after the treatment, and therefore, is not a component of the membrane.

### *Response to Amendment*

Applicant's arguments filed on 8/21/02 have been fully considered but they are not persuasive.

Applicant has not amended the claims other than correcting for the claim numbers in the amendment filed on 8/21/02 in response to the non-final action (paper 4). Applicant brings forth four reasons why the applicant's claims overcome the combination references Cadotte (US 4,765,897) in view of Koo (US 6,063,278). Examiner's reply to the three reasons in the arguments is as follows:

1. Substitution of one chemical from one reference with another from another reference – teaching of such substitution required in one of the references or discernable from general chemical knowledge: Organic sulfonic acids are considered strong acids like mineral acids in general chemistry. Cadotte (897) teaches a strong mineral acid like phosphoric acid or sulfuric acid. Koo (278) teaches the use of strong acids such as organic sulfonic acids or nitric acid, hydrochloric acid or sulfuric acid (col 3 lines 30-37). Thus Koo (278) teaches that an organic sulfonic acid could be substituted for a mineral acid. Thus, the combination of Cadotte (897) with Koo (278) does make the applicant's claims obvious under §103(a).

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2. The reasoning that Koo (278) places the sulfonic acid directly into the aqueous solution to form a salt: Cadotte (897) teaches that the acid increases the permeability and decreases the salt rejection by swelling the membrane, but otherwise does not deleteriously affect the membrane (col 4 lines 3-7). The argument is not whether the process step in Koo (278)'s method is applied to make the membrane in place of Cadotte (897)'s method but whether an organic sulfonic acid could be used in place of a mineral acid as taught by Cadotte (897) to swell the membrane. Since Koo's (278) teachings show that the organic sulfonic acid could be used in place of mineral acids, the rejection under 103(a) is supported by Cadotte (897) in view of Koo (278), and is proper.

3. The reasoning that Cadotte (897) teaches treatment with a rejection enhancing agent subsequent to the acid treatment to have an acceptable minimum magnesium sulfate rejection of 85%: Cadotte's (897) treatment with a rejection enhancing agent is irrelevant to the instant application. The instant application claims flux enhancement at the cost of lowering the rejection to obtain a polyamide thin film membrane with sodium chloride rejection of at least 20% with a flux of 15GFD at 25C, 75 psi and 0.05% NaCl. Cadotte (897) teaches that treating a polyamide thin film membrane with a mineral acid enhances the flux at the cost of some loss in rejection (col 4 line 56-col 5 line 4), and shows that effect with magnesium sulfate rejection as example. What the instant application claims is increasing the flux by treating with an organic sulfonic acid, gain in flux causing a corresponding loss of rejection. Cadotte (897) teaches phosphoric acid or sulfuric acid, and Koo (278) teaches that an organic sulfonic acid could replace the mineral acids. Thus the rejection is within the meaning of §103 (a). It may also be noted that Cadotte's (897) polyamide thin film membrane has 15-30 GFD flux and 93-98% rejection at 200 psi and 25C with 0.2% NaCl (col 2 lines 50-54), which translates to about 6 to 12 GFD at 75 psi for 0.2% NaCl, and would be more if

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the salt concentration is 0.05% (flux would increase as the salt concentration reduces because of the reduction of the osmotic pressure).

4. Applicant's argument of a 'superior product': The applicant argues that the product is superior as given in table 7 of instant application. However, the applicant is not claiming a superior product, the applicant claims a polyamide thin film membrane with at least 20% NaCl rejection and 15 GFD flux at 50 psi (instant claim 15), and 80% NaCl rejection and 5GFD at 150 psi (instant claim 26) with 0.05% NaCl at 25C. Cadotte (897) teaches a membrane superior to the claimed membrane in terms of flux and rejection (tables I, II and III).

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Claims 15-26 (amended) stand rejected under §103(a) as unpatentable over Cadotte (897) in view of Koo (278).

Conclusion

Action: Non Final  
interview Su-  
mary  
paper #7

~~THIS ACTION IS MADE FINAL.~~ Applicant is reminded of the extension of time  
~~policy as set forth in 37 CFR 1.136(a).~~

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the



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THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krishnan S Menon whose telephone number is 703-305-5999. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L Walker can be reached on 703-308-0457. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Krishnan S. Menon  
Patent Examiner  
October 9, 2002

  
W. L. WALKER  
SUPERVISORY PATENT EXAMINER  
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